

# My Research Students and I

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# My supervision experience

- In the past
  - 4 PhD students
  - 7 MPhil students (2 did not make it)
  - Research student interns
  - Post-doctoral training
  - Many MSc dissertations
  - A few research-based final-year projects
- Currently
  - 3 PhD students
  - 1 MPhil
  - A number of research staff

# Learning by experience

- Learning mostly from failures
- Some general principles and issues
- But each student is (very) different.
- The goal is the same, though.
  - Training them to be independent researchers
  - 大将, 不是小兵
- Students graduated are no longer treated students.

# As a supervisor,

- A coach but NOT a manager or project leader
  - The students are players.
- A coach trains and develops a player's basic skills.
- A coach helps a player identify his strengths and weaknesses.
- A coach guides a player to become mature.
- A coach models what he teaches.
- A coach always gives time to his player.

# Common issues

- How to read research papers?
  - “How to Read a Paper” by S. Keshav
  - Reading with a purpose
- How to write research papers?
  - Title → Abstract → Introduction → Main text
- How to write?
  - Grammar, expressions, style, argument
- How to conduct research?
  - Motivation, analyzing the problem, the rest

# How to write?

- A writing workshop based on “Lessons in Clarity and Grace” by J. M. Williams in 2010
- A writing workshop based on “Bugs in Writing”  
lyn dupre in 2006
- Practical advice:
  - Write emails in English.
  - Write a page of summary every week.
  - Analyze how good writers write.

# Write, write, write

- Writing – expressing our thoughts in words
- Writing is therefore a thought process, not only a reporting process.
- Writing will clarify and organize our thoughts.
  - NOT clarifying and organizing our thoughts first and then write.
- Reading and doing without writing → indigestion
- There is no other way of passing our work along without writing.
- A researcher/scholar is a writer.
  - Writer: a person who commits his thoughts, ideas, etc to writing

# How to write research papers?

- The title is the abstract of the abstract.
- The abstract is the abstract of the introduction.
- The introduction is the abstract of the main text.
- The writing order:
  - Think about a short and specific enough title to summarize the paper.
  - Write an abstract to summarize the paper.
  - Write an introduction to summarize the paper.



# An example: choosing a title

- `\title{OneProbe: An uncooperative tool for unified path measurement using web services}`
- `\title{OneProbe: An uncooperative tool for multi-metric path measurement using web services}`
- `\title{OneProbe: An integrated tool for uncooperative path measurement using web services}`
- `\title{UniProbe: A cross-metric tool to measure end-to-end path performance}`
- `\title{UniProbe: A cross-metric tool to measure bi-directional path performance}`
- `\title{OneProbe: A solo-active system for measuring data-path quality using multiple metrics}`
- `\title{OneProbe: A solo-active system for characterizing data-path quality with multiple metrics}`
- `\title{OneProbe: A Solo-Active System for Measuring Data-Path Quality}`
- `\title{OneProbe: A Solo-Active System for Profiling Data-Path Quality}`
- `\title{Sampling network path quality using TCP probe streams}`
- `\title{Instrumenting TCP probe streams for reliable network measurement}`
- `\title{Design and implementation of TCP data probes for reliable network path monitoring}`

# How to conduct research?

- The important stage: analyzing the problem and motivation
  - Who will benefit from your research?
  - Where is the gap that you will narrow?
- What motivated us to study this problem?
  - Why is this problem important?
  - What are the research problems?
- How much do I know about this problem?
  - What is the problem?
  - Why is the problem hard?
  - What is the solution space and the trade-offs?
  - Would the contributions be significant?
- The remaining stages will be easier.

# An example: IRate

- This problem applies to HTTP streaming and DASH, right?
- Is there no systematic method for determining the initial bitrate? Why is the problem hard?
- Why did you choose a server-side solution?
- What are the novelties in the proposed Irate? The names are cute. But why are they novel?
- How to evaluate the initial bit rate selection?
- "IRate can correctly select a suitable initial video bitrate which causes no rebuffering events." I do not understand the relationship between initial bit rate and the rebuffering events which also depends on the threshold for the playback and buffer size. But IRate is determined only based on the e2e network condition. May be you did not explain the mechanism of the oracle enough in the abstract.

# Closing the loop asap

- Help students go through the loop once as soon as possible.
  - Instead of getting stuck in a step
- Find a piece of focused work and set the goal for a poster/demo or a short paper.
  - Doing and writing, not just doing
- Expand the work into a full paper
  - A NSDI poster/demo into a 12-page CoNEXT submission

# As a student,

- Work hard and communicate hard.
- Report what you have done every week.
  - Discuss even immature ideas.
- Allocate your time into
  - Reading
  - Writing (including presentations)
  - Doing (programming, experiments, ...)
  - Talking to others
- Talk to different people.
- Ask questions.

# What else are very important?

- Research ethics
  - Research Ethics and CS (Sept. 2012)
  - Authorship in Research Papers (Oct. 2012)
  - What have I learned from the IM submission? (Jan. 2013)
- Character issues
  - Unwilling to share
  - Unwilling to get/acknowledge help from others
  - Unwilling to admit mistakes

# “Your students are your legacy” by D. Patterson

- “Thirty-two years later, I can confirm that hypothesis: your main academic legacy is the dozens of students you mentor, not the hundreds of papers you publish.”
- “My advice to advisors is to get your students off to a good start, create stimulating research environments, help them acquire research taste, be a good role model, bolster student confidence, teach them to speak well publicly, and help them up if they stumble, for students are the real coins of the academic realm.”

Thanks